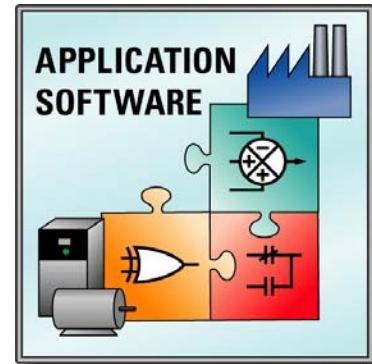


Drive Application Software

Application Set

Application Set Title	Position Profile – Encoder Incremental	
Drive Product	PowerFlex® 700 Vector Control (Series B)	
File Name for (AS)	AS_PF700 Position Profile Encoder Incremental.doc	
Date / Revision	8/11/05	01

Attention: This document and related file(s) are designed to supplement configuration of the listed drive product. The information provided does not replace the drive products user manual and is intended for qualified personnel only.



Description: The Position Profile is used to move incrementally to the desired position. The position is determined by the step being used as the starting step. For this example, two selector switches (Pos Sel 1 & Pos Sel 2) are used to choose step 1, 2 or 3 as the starting position.

Limitations: If both selector switches (Pos Sel 1 & 2) are off (false) when a start command is issued, the profile will not operate because this is an invalid state. To recover from this the drive must be stopped and profiling must be disabled via P88 or power must be cycled.

Options & Notes: The starting step of the indexer can be controlled via digital inputs or by manipulation of the Pos/Spd Prof Cmd word. This example uses digital inputs.

After downloading *.dno file, the Motor Data and Motor Tests portions of the Basic Startup should be performed through the LCD HIM. Then tune the Speed Regulator Bandwidth and Position Regulator Filter and Gain for desired performance.

Drive Input & Output Connections:

Inputs	Function	Description
DI 1	4 – Stop CF	P361
DI 2	5 - Start	P362
DI 3	0 - Not Used	P363
DI 4	52 – Pos Sel 1	P364
DI 5	53 – Pos Sel 2	P365
DI 6	0 – Not Used	P366
AI 1		Not Used
AI 2		Not Used
Outputs	Function	Description
DO 1		Not Used
DO 2		Not Used
DO 3		Not Used
AO 1		Not Used
AO 2		Not Used

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Parameter Configurations

Changes from Default Parameter Settings (Any listed defaults are in gray.)

Par	Name	Value	Link	Description
41-45	Motor NP . . .	per nameplate		(Data entered per motor nameplate)
53	Motor Cntl Sel	4 - "FVC Vector"		
80	Feedback Select	3 - "Encoder"		Must use quadrature and differential encoder
88	Speed/Torque Mod	7 – "Pos/Spd Prof"		Enables position/speed profiling.
153	Regen Power Lim	-200.0		This must be set high enough (negative) to not limit deceleration into position otherwise overshoot will occur.
161	Bus Reg Mode A	Dynamic Brak		All regenerative energy dissipated into braking resistor.
163	DB Resistor Type	Internal Res		An External resistor may be required for high duty cycle or low friction applications. Sizing of resistor is determined by the loads and speeds of application.
190	Direction Mode	1 – "Bipolar"		Allows position loop to control direction.
259	Alarm Config 1	Bit 17 = 0		Disables alarm condition to defeat requirement to run a homing routine. The User must determine if this is necessary for the application.
449	Speed Desired BW	40 Rad/Sec.		Typical range will be 20-40 rad/sec. Adjusting this will automatically change Parameters 445 and 446
445	Ki Speed Loop	(475.8)		For Reference Only. Automatically adjusted when Parameters 449 is changed.
446	Kp Speed Loop	(47.6)		For Reference Only. Automatically adjusted when Parameters 449 is changed.
450	Total Inertia	(1.19 Sec)		For Reference Only. Automatically determined during inertia autotune. (Note: Kp = BW x Inertia)
***	Position Indexer			
705	Pos/Spd Prof Cmd	Bit 0 = Bit 1 = Bit 2 = Bit 3 = Bit 4 = Bit 5-7 = na Bit 8 = 0 Bit 9 = 0 Bit 10 = 0 Bit 11 = 0 Bit 12-15 = na		Bits 0 – 4 Control what step the profile will start at. The digital inputs are used in this setup as noted on page 1. (binary value determines step number) Bits 8 Hold Step, not used Bit 9 Redefine Pos, not used Bit 10 Find Home, not used Bit 11 Vel Override, not used
707	Encoder Pos Tol	10		Defines the tolerance window of "at position".
708	Counts per Unit	4096		This defines the number of encoder pulses equal to 1 unit. It can be scaled to a rotational or linear motion as desired by the User. (4096 = 1 rev of 1024PPR quadrature encoder)
713	Find Home Speed	10% of max		Default is 1/10 of maximum speed. Set to the lowest possible value to reduce overshoot.
714	Find Home Ramp	10.0		This value will typically be less than the default value of 10 seconds.

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718	Pos Reg Filter	75		This is a low pass filter whose value should be 5-6 times the gain value set in P719.
719	Pos Reg Gain	12		This gain adjusts the responsiveness of the position regulator. Increase the value for better response.
***	Step Data			
720	Step 1 Type	4		Selects an encoder incremental move.
721	Step 1 Velocity	500.0		Speed and direction for step 1
722	Step 1 AccelTime	1.00		Acceleration time for step 1
723	Step 1 DecelTime	1.00		Deceleration time for step 1
724	Step 1 Value	10.00		Number of units to travel for step 1
725	Step 1 Dwell	1.00		Seconds to hold at position when step value is reached.
726	Step 1 Batch	1		Number of times to do this step consecutively.
727	Step 1 Next	16		The step to go to after this step is complete.
730	Step 2 Type	4		Selects an encoder incremental move.
731	Step 2 Velocity	1000.0		Speed and direction for step 2
732	Step 2 AccelTime	1.00		Acceleration time for step 2
733	Step 2 DecelTime	1.00		Deceleration time for step 2
734	Step 2 Value	15.00		Number of units to travel for step 2
735	Step 2 Dwell	1.00		Seconds to hold at position when step value is reached.
736	Step 2 Batch	1		Number of times to do this step consecutively.
737	Step 2 Next	16		The step to go to after this step is complete.
740	Step 3 Type	4		Selects an encoder incremental move.
741	Step 3 Velocity	1500.0		Speed and direction for step 3
742	Step 3 AccelTime	1.00		Acceleration time for step 3
743	Step 3 DecelTime	1.00		Deceleration time for step 3
744	Step 3 Value	20.00		Number of units to travel for step 3
745	Step 3 Dwell	1.00		Seconds to hold at position when step value is reached.
746	Step 3 Batch	1		Number of times to do this step consecutively.
747	Step 3 Next	16		The step to go to after this step is complete.
870	Step 16 Type	7		Selects "End and Hold Position"
871	Step 16 Velocity	0.00		Speed and direction for step 16
872	Step 16 AccelTime	1.00		Acceleration time for step 16
873	Step 16 DecelTime	1.00		Deceleration time for step 16
874	Step 16 Value	n/a		Number of units to travel for step 16
875	Step 16 Dwell	0.50		Seconds to hold at position.
876	Step 16 Batch	1		Number of times to do this step consecutively.
877	Step 16 Next	16		The step to go to after this step is complete.

Tuning Tips:

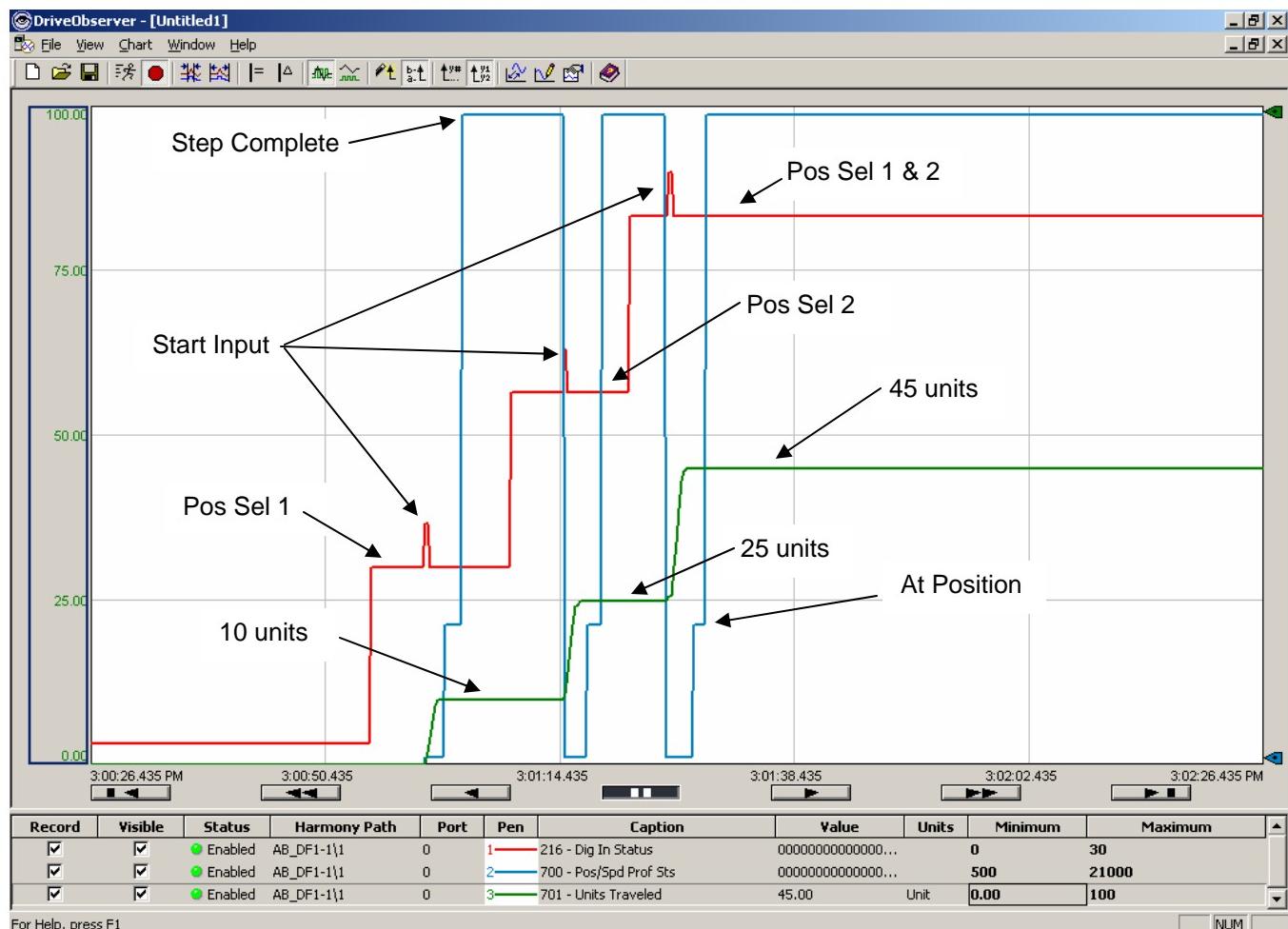
- After downloading the *.dno file, the *Motor Data* and *Motor Tests* portions of the Basic Startup should be performed through the LCD HIM.
- Speed Regulator Settings
P449 [Speed Desired BW] should be set to a point below where instability occurs.
- Position Regulator Settings
P719 [Pos Reg Gain] should be increased to a value that is just below the point where overshoot occurs.
P718 [Pos Reg Filter] must be adjusted at a rate that is 5-6 times the value of P719.

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The plot below shows how the profile will operate when a different starting step is used. The sequence was as follows:

1. Pos Sel 1 = on, Pos Sel 2 = off. A start command issued. Step 1 moves incrementally 10 units. Once at position, a one second dwell at position occurs. The step completes and jumps to step 16 which is programmed to end the profile.
2. Pos Sel 1 = off, Pos Sel 2 = on. A start command issued. Step 2 moves incrementally 15 units (total of 25). Once at position, a one second dwell at position occurs. The step completes and jumps to step 16 which is programmed to end the profile.
3. Pos Sel 1 = on, Pos Sel 2 = on. A start command issued. Step 3 moves incrementally 20 units (total of 45). Once at position, a one second dwell at position occurs. The step completes and jumps to step 16 which is programmed to end the profile.



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Wiring Diagram

